IS 12484 (1999): Cup Seal for Fluid Power Applications [PGD 16: Fluid Power]

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IS 12484 : 1999
(Reaffirmed 2004)

भारतीय मानक

तरल शक्ति में अनुप्रयोग के लिये कप सील – विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

CUP SEAL FOR FLUID POWER APPLICATIONS — SPECIFICATION

(First Revision)

ICS 23.040.80

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 1999

Price Group 3

Basic Fluid Power Sectional Committee, PE 14

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Basic Fluid Power Sectional Committee had been approved by the Production Engineering Division Council.

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. One component of such systems is the cup seal. This type of seal is used for retaining fluid or grease in equipment employing rotating shaft. In some instance the shaft is stationary and the housing rotates. Sealing of these type of seal with low differential pressure is normally a result of a designed interference fit between the shaft and the flexible sealing element, which is usually fitted with a garter spring. An interference fit between the outside surface of the seal and the housing bore surface retains the seal in the housing and prevents leakage at the outer diameter. Cup seals are meant for piston seal application only and are not to be used as gland seals.

This Indian Standard was first published in 1988. This revision covers almost all dimensions of cup seals used in the industry. Following are the main changes made in this revision:

a) Amendment No. 1 has been included.
b) Reference clause has been added.
c) Grades have been reduced from five to two as cup seals of pressure rating above 16 MPa are generally not used.
d) Materials clause has been changed and made more flexible.
e) Designation clause has been changed.
f) Drawings for single and double acting single cup seals, Type A in Table 1 have been modified.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CUP SEAL FOR FLUID POWER APPLICATIONS — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers the dimensions, materials and other requirements of cup seals for use in fluid power application.

2 REFERENCE

The following standard contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
6713 : 1972	Code of practice for storage of vulcanized rubber

3 TYPES

3.1 Type A — Single cup seal, and

3.2 Type B — Double cup seal.

4 GRADES

The cup seals shall be of the following grades depending upon the pressure rating:

Grade	*Pressure Rating (Maximum)*
Grade 1	8 MPa
Grade 2	16 MPa

5 DIMENSIONS

Dimensions for Type A and Type B seals are given in Tables 1 and 2 respectively.

6 MATERIALS

6.1 The material of cup seals shall be as agreed between the user and the manufacturer depending upon the operating conditions like fluid medium, temperature and pressure.

6.2 Guidelines for selection of suitable material is given in Annex A.

6.3 Steel Washer and Spring

Suitable steel plated with chromium or cadmium for protection against rust.

7 DESIGNATION

7.1 A single cup seal Type A of nominal diameter D = 20 mm and for application up to 8 MPa (Grade 1) conforming to this standard shall be designated as:

Cup seal IS 12484..... 1A 20

7.2 A double cup seal Type B of nominal diameter D = 25mm and for application up to 8 MPa (Grade 1) conforming to this standard shall be designated as:

Cup seal IS 12484..... 1B 25

8 GENERAL REQUIREMENTS

8.1 The sealing surfaces and lips shall be free from cuts, blisters and other manufacturing defects.

8.2 Construction

The construction of the double cup type seal consists of a steel washer with two single cup type seals (with springs) placed together with lips opposite to each other. The steel washer of thickness T is placed in between the two packings and vulcanized to form one piece. In addition to above, a fixing layer (t) is also provided on both sides of the washer. One of these fixing layers extends up to the bore and has a thickness of 0.5 mm in order to strengthen the seal so formed.

9 MARKING

9.1 Each seal shall be marked with the following information:

a) Designation of the seal,
b) Material of the seal,
c) Number of pieces,
d) Manufacturer's name or trade-mark, and
e) Month and year of manufacture.

9.2 BIS Certification Marking

The cup seals may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provision of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10 PACKING

The cup seals shall be packed as agreed to between the purchaser and the manufacturer.

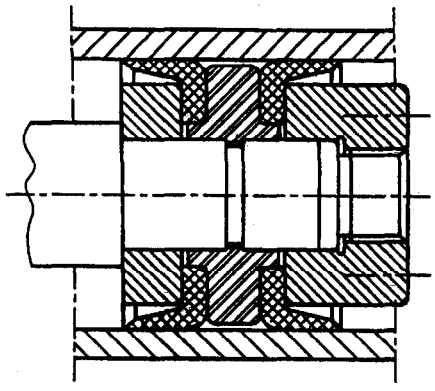
11 STORAGE

Cup seals shall be stored according to IS 6713.

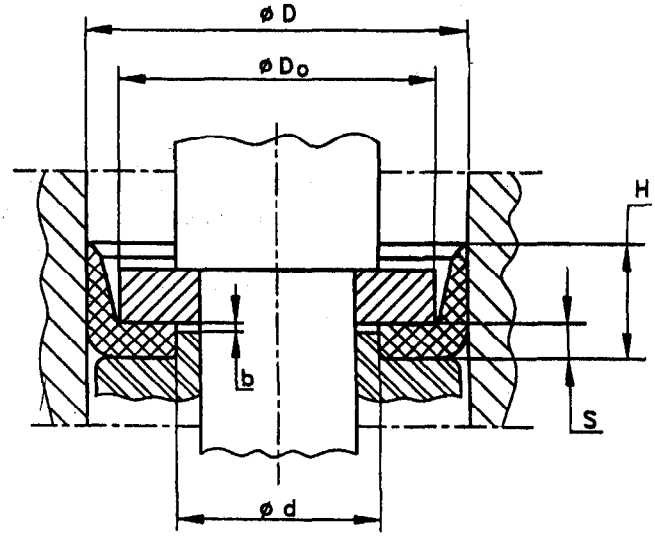
Table 1 Dimensions for Single and Double Acting Cup Seals, Type A

(*Clause* 5.1)

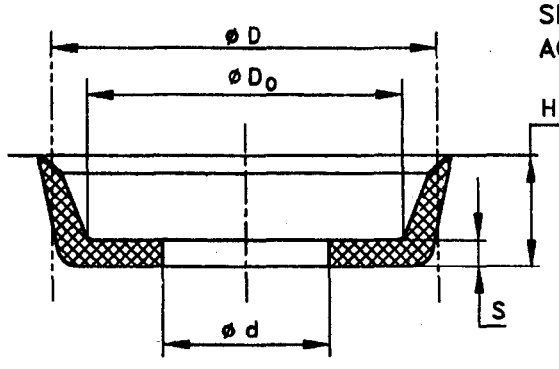
All dimensions in millimetres.



SINGLE CUP DOUBLE ACTING SEAL ASSY.



SINGLE CUP SINGLE ACTING SEAL ASSY.



SINGLE CUP SEAL

ø D	ø d	ø D_o	H	S	b	ø D	ø d	ø D_o	H	S	b
12	3	8	6	1.5	0.2	20	8	15.5	6	2	0.4
14	6	10	5	1.5	0.2	20	8	15	7	2	0.4
15	6	11	5	1.5	0.2	20	10	15.5	5	2	0.2
16	3	11	8	2.5	0.3	25	10	19	10	5	0.4
16	6	13	4	1.8	0.4	25	12	19	10	3	0.4
16	7	11	6.5	2	0.2	25	16	21	5	1.5	0.2
17	8	13	7	1.5	0.2	26	8.2	21	8	2.2	0.3
18	5	13	5	2	0.2	27	11	20.5	8	3	0.3
20	6	13	10	3	0.4	28	16	22.5	8	2.5	0.3
20	7.7	14	6	2.2	0.4	30	10	25.5	6	2	0.2

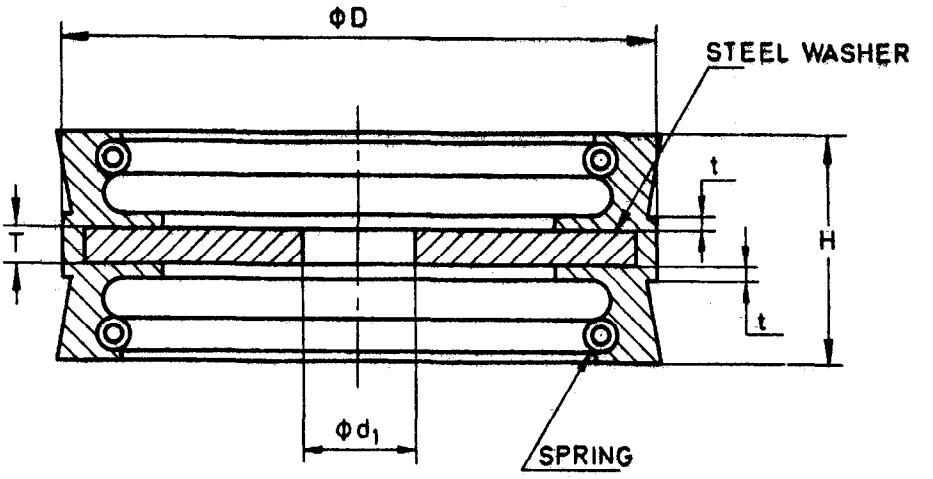
Table 1 (*Concluded*)

ø *D*	ø *d*	ø D_0	*H*	*S*	*b*	ø *D*	ø *d*	ø D_0	*H*	*S*	*b*
32	8	26	10	2	0.4	100	65	93	10	3	0.3
32	19.2	26.5	10	1.5	0.4	102	21	95	21	4	0.4
34	18	27	10	3	0.3	110	70	103	15	3.5	0.4
35	8.1	29	7	2.5	0.3	115	76	108	11	3	0.3
35	10	29	8	2.5	0.3	120	76	113	20	4	0.4
36	18	31	6	2	0.2	120	99	113	14	3	0.3
37	18	30	7	3	0.3	125	45	113	30	5	0.5
40	6	35.5	6	2	0.2	125	50	113	30	5	0.5
40	15	33	12	4	0.4	125	80	114	20	4	0.4
40	16	34	10	2	0.2	125	81	113	25	4	0.4
40	16	32	15	3	0.3	125	88	117	18	4	0.4
40	16.5	32	13	4	0.4	130	43	119	23	4	0.4
40	20	33	10	3	0.3	130	105	123	12	3	0.3
40	20	32	15	3	0.3	140	92	133	28	5	0.5
40	21	33	10	3	0.3	140	50	133	15	3.5	0.4
40	26	32.5	9.5	4	0.4	145	100	139	15	3	0.3
42	18	36	10	3	0.3	150	120	142	18	4	0.4
45	27	39	10	3	0.3	160	80	149	24	4	0.4
46	27	38	11	3	0.3	160	110	152	15	3	0.3
48	30	40	9	3	0.3	160	110	149	20	5	0.4
50	10	40	20	4	0.4	160	115	149	20	6	0.4
50	10	39	25	4	0.4	160	120	147	20	5	0.4
50	15	41	15	4	0.4	165	120	152	21.5	6.5	0.7
50	20	43	10	3	0.3	175	115	166	18	4	0.4
50	24	42	16	4	0.4	180	130	171	15	4	0.4
50	27	41	14	4	0.4	190	145	176	21.5	6.5	0.7
50	28	39	20	5	0.5	195	70	184	28	5	0.5
50	30	43	10	3	0.3	200	35	188	30	5	0.5
50	30	42	14	4	0.4	200	150	188	20	5	0.5
52	20	46	8	2.5	0.3	200	162	190	18	4	0.4
55	16	48	10	3	0.3	205	128	194	21	5	0.5
60	24	53	12	3	0.3	230	150	221	18	4	0.4
60	40	54	8	2.5	0.3	240	170	230	20.5	4.5	0.5
62	40	55	12	3	0.3	250	210	239	20	5	0.5
63	20	55	16	4	0.4	250	175	237	30	5	0.5
63.5	16.5	56	15	3.5	0.4	250	200	240	20	4	0.4
65	25	57	12	3	0.3	260	190	243	25	8	0.8
66	16	59	16	4	0.4	290	205	279	35	5	0.5
70	20	62	13	3	0.3	300	260	289	24	5	0.5
70	40	64	13	3	0.3	305	180	294	25	5	0.5
70	50	64	8	2.5	0.3	315	270	304	25	5	0.5
70	44	62	12	3	0.3	320	240	309	25	5	0.5
75	25	68	15	4	0.4	335	254	324	25	5	0.5
76	20	69	16	4	0.4	350	300	339	25	5	0.5
80	20	71	20	4	0.4	360	300	349	30	5	0.5
80	45	70	25	4	0.4	400	360	388	20	4	0.4
80	42	72	16	4	0.4	400	354.5	389	24	5	0.5
80	50	74	13	3	0.3	450	380	433	20	8	0.8
90	65	83	12	3	0.3	450	410	441	24	4	0.4
95	38	87	15	4	0.4	450	401	439	24	5	0.5
100	35	89	25	4	0.4	475	412	464	35	5	0.5
100	40	89	25	4	0.4	500	431	489	24	5	0.5
100	60	90	18	4	0.4	525	455	510	20	7	0.7
						550	510	541	27	4	0.4

Table 2 Dimensions for Double Cup Seals, Type B

(*Clause* 5.1)

All dimensions in millimetres.



ø *D*	ø d_1 H_{10}	*H*	*T*	*t*	ø *D*	ø d_1 H_{10}	*H*	*T*	*t*
25	8	22	3	1.5	80	12	30	5	1.5
30	8	22	3	1.5	85	12	35	6	2.0
32	8	25	3	1.5	90	12	35	6	2.0
35	8	18	2	2.0	100	12	35	6	2.0
35	8	26	3	1.5	100	12	40	6	2.0
38	8	25	3	1.5	120	20	40	8	2.5
40	10	25	3	1.5	125	30	50	8	4.0
45	10	25	4	1.5	125	20	40	8	2.5
50	10	25	4	1.5	130	20	40	8	2.5
55	10	25	4	1.5	140	20	40	10	2.5
60	12	27	4	1.5	150	20	40	10	2.5
63	12	25	4	1.5	160	20	40	10	2.5
65	12	25	4	1.5	175	20	40	10	2.5
70	12	30	5	1.5	180	20	40	10	2.5
75	12	30	5	1.5	200	20	40	10	2.5
					250	20	40	10	2.5

ANNEX A

(*Clause* 6.2)

MATERIAL PROPERTIES AND SELECTION GUIDELINES FOR CUP SEALS

Material Clause	*Specification of Compound*	***Hardness (Shore A)***	***Maximum Pressure MPa***	*Temperature Range (°C)*	*Tensile Strength MPa*	*Advantages*	*Disadvantages*	*Application*	*Remarks*
A	Nitrile-butadiene	75 ± 3	10	– 30 to + 130	10 to 20	1) Low swelling 2) Fair dry running characteristics	1) Lack of exceptional heat resistance	1) For general use in retaining lubricants and excluding mud, dirt, water, etc	Cheap for normal use
B	Nitrile-butadiene	85 ± 3	21			3) Good processing characteristics 4) Good low termperature characteristics	2) Tendency to harden during high temperature usage	2) High pressure hydraulic and lubricating oil pumps, water lines, gas lines compressors, general equipment	Standard quality
C	Vinylidine flouride and hexaflouro propylene copolymer (viton)	90 ± 3	35	– 25 to +200	10 to 15	1) Good moderate temperature performance 2) Low swelling 3) If the shaft run cut is low, these may be used at low temperature	1) Poor low temperature properties 2) Poor dry running characteristics	Chemical equipment hydraulic oil with additives and all above application	Medium cost range
D	Polytetra flouro-ethylene	98 ± 1	35	– 200 to +200	20 to 35	1) Good heat resistance 2) Excellent low temperature properties	—	Refrigerants oxygen aggressive fluids	Extensive highly abrasion less elastic
E	Silicon compunds semi organic elastomers	60 to 80	10	– 50 to +175	5, *Min*	1) Good heat stability 2) Good low temperature properties 3) Low shrinkage factor 4) Low setting properties	The maximum usable temperature is limited by decomposition temperature of lubricants	In general equipment, automobile sealing, etc	High cost range

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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